Competition among Health Plans: A Two-Sided Market Approach*

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Abstract

Classical analysis of health insurance markets often focuses on adverse selection, which creates a direct externality between the enrollees of the same health plan: under an imperfect risk adjustment, the higher the risks of my co-enrollees, the higher my cost of insurance. This has lead to the view that restricting the diversity of accessible physicians may be good for policyholders, in a context where competition between health plans can lead to a "spiral of death" for the less restrictive plan. This paper defends the opposite view that diversity might pay, because of the indirect externality between policyholders and physicians. By attracting higher risks, the less restrictive plan may also guarantee a higher level of activity to its physicians, and therefore negotiate with them a lower fee-for-service rate. By explicitly modeling the two sides of the market for health (policyholders and physicians), we are able to find examples in which competition between health plans gives a higher profit to the less restrictive plan.

Keywords: Two-sided Markets, Managed Care Competition, Network Effects, Adverse Selection.

Jel Codes: I11, L11, L42.

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1 Introduction

Adverse selection is often presented as a major problem in competitive health insurance markets (Cutler and Zeckhauser, 1998). This phenomenon usually occurs when premiums set by Health Plans do not perfectly reflect the heterogeneity in policyholders' health risk. This imperfect risk adjustment can be caused by different reasons. For example, it may be impossible or too costly for insurers to set differentiated premiums taking into account the risk factors that would allow to reflect this heterogeneity. The regulation of health insurance contracts can also prevent Health Plans from setting premiums in an individual risk adjustment fashion. Moreover, when policyholders subscribe health insurance contracts linked to their jobs, employers often supply a menu of health insurance plans and also set employee premiums for each plan provided (Pauly et *al.*, 2004). In this case, employers' subsidies may alter employees' choices. As it is explained in Enthoven (1980), when a "fixed dollar contribution" model is used, Health Plans' premiums reflect differences in average total cost and not in individual expected health expenditure.

In this context, each policy holder has obviously an interest to choose a Health Plan that supplies coverage against the lowest possible premium and therefore to withdraw from plans that would attract higher risks than himself. In a dynamical setting, this behavior can lead to a "spiral of death" phenomenon (Buchmueller and Feldstein, 1997), whereby less restrictive plans attract high risks and therefore repel low and medium risks, with a cumulative effect. When an interior equilibrium occurs, high risks choose generous plans whereas low risks seek lower prices (Altman et *al.*, 1998). In equilibrium, since premiums reflect more or less the average cost of a Health Plan's policyholders, the surplus of a policy holder depends on the characteristics of the other enrollees. Such an adverse selection phenomenon can be viewed as a classical network externality between policyholders.

Following the Rothschild and Stiglitz's pioneer model,[1] most of economists have considered that insurers can only use the level of coverage if they want to screen policyholders. This analysis is clearly relevant for the general insurance sector, but as far as health insurance is concerned, it does not take into account an important variable, namely the diversity of physicians to whom policyholders have access. This diversity varies a lot from one Health Plan to another, due to the vertical integration wave that has characterized the health insurance sector. Indeed, the number of Managed Care Organizations (MCOs) has dramatically increased during the last two decades.[2] Between 1994 and 1997, the market share of PPOs grew from 44.8 to 47.3 percent, the HMOs market share increased from 22.5 to 26.9 percent whereas the conventional insurers' market

[1] Rothshild and Stiglitz (1976).

[2] Dranove (2000) reports that 80 percent of working Americans were already enrolled in MCOs in 1998.

share decreased from 32.8 to 21.2 percent.[3] As Chernew and Frick (1999) suggest, it is important to add a new variable (that they call "managedness") to the classical adverse selection models in order to really capture the nature of managed care competition. Maybe more than the deductible level, the number of physicians affiliated to networks of care and the modality of access to care play key roles in the outcome of competition between Health Plans. Actually, both kinds of Health Plans restrict the choice of providers. When MCOs adopt the Health Maintenance Organizations' form, policyholders cannot choose a physician outside of the list of physicians affiliated to their HMOs if they do not want to pay their entire health care expenditure. A PPO's policy holder can choose physicians who do not belong to the list of the network but has to pay some copayments. Obviously, Health Plans' vertical restrictions in policyholders' choices reinforce the risk segmentation that we have just described. All other things equal, high risks prefer insurers that give larger flexibility and that provide a high choice of physicians and hospitals. In a context of competition between conventional insurers[4] and HMOs, Baker and Corts (1996) show that this risk segmentation effect is very important for explaining the premiums' differential between these two types of insurers.

This risk segmentation effect is not the unique source of the MCOs lower premiums. Several reasons are given in the health economics literature to explain this point: vertical integration helps to decrease providers' moral hazard (Ma and Riordan, 2002)[5], to increase competition in the health insurance sector (Baker and Corts, 1996), to reduce the transaction costs, but mainly it allows MCOs to negotiate lower prices from providers. Indeed, Brooks et *al.* (1997) and Cutler et *al.* (2000) have shown that a consistent part of their lower expenditure is explained by lower unit prices. By parceling out the different effects involved, Altman et *al.* (2003) equally show that the difference in health expenditure between HMOs and Conventional Insurers[6] comes, for a non negligible part (45%), from differences in the price of the same services. These results are corroborated by Dor et *al.* (2004). After controlling heterogeneity in procedure intensity, enrollee mix and some market power effects, these authors observe that on average, PPOs' prices are 8 percent lower than conventional insurers' ones and that HMOs Point-of-Service[7] obtain a discount of 24 percent.

If the risk segmentation and the price discounts are two MCOs' penetration effects that are sometimes studied together, the interaction of both effects is usually ignored. As noted by Altman et *al.* (2003), "*we parcel out direct (non interactive) effects.*" Nevertheless, in a recent paper, Akashi (2005) analyzes in a same framework the demand for health plans and the demand for medical services. Her analysis allows to capture some network effects since a policyholder's

[3] Data from Health Insurance Association of America (2002). http://www.ahip.org.

[4] Conventional insurers do not restrict their policyholders' choices of physicians.

[5] See also Bourgeon et al (2006).

[6] Or Indemnity Plans.

[7] HMOs Point-of-Service are usually presented as a hybrid form between conventional insurers and HMOs staff model.

choice of health plan may influence his physicians' choices. Her results suggest that a smaller staff size improves health care quality. However in Akashi's paper, the market structure is given. Thus, it does not take into account the impacts of policyholders' demands (health plans and health care) on providers' strategies and on the discounts obtained by health plans. In a model where policyholders choose their health plans and their providers, Ho (2004) investigates the determinants and the welfare impacts of observed hospitals' networks. She shows that hospitals that do not need to contract with all health plans to secure their demands have a higher bargaining power when they negotiate with health plans. Moreover, her results reveal that vertical restrictions generate sizable inefficiencies.

The present paper is among the first attempts[8] to model the two-sided nature of health plans' competition. By this we mean that health insurance markets are characterized by indirect network externalities between providers and policyholders. Roughly speaking (see Jullien [2005] and Rochet and Tirole [2005][9] for more details), a market structure is two-sided when "*an end-user does not internalize the full impact of his use of the platform on the welfare of another category of end-users.*" In practice, Health Plans compete for policyholders on one side but also compete to attract physicians in their networks. The goal of our model is to study the consequences of indirect network effects between these two sides of the health insurance market. As already mentioned, a Health Plan allowing access to a large number of physicians attracts policyholders characterized by a higher risk than the average risk of the population.[10] In an one-sided analysis, this risk segmentation would only be a disadvantage for this Health Plan because of the higher number of reimbursements generated. In our two-sided framework, this risk segmentation implies that this Health Plan generates more activity for the physicians belonging to the network and therefore can negotiate with them a lower fee-for-service rate. Then, the Health Plan with the highest number of physicians which also attracts the highest risks in the population, may however realize the highest profit in equilibrium.

Section 2 presents the model. Section 3 is devoted to the equilibrium analysis. We conclude in Section 4.

[8] Two recent exceptions are Howell (2006) who provides a taxonomy for thinking about competition in health care markets and Demange and Geoffard (2006) in their last section.

[9] Other references on two-sided markets are Rochet and Tirole (2003), (2006) and Armstrong (2006).

[10] See Baranes and Bardey (2005) for the description of a similar effect for the competition between HMOs and conventional insurers.

2 The model

Three kinds of agents are considered:

- policyholders who can become ill with an exogenous probability (no *ex ante* moral hazard is considered here). This probability θ is heterogenous across policyholders and constitutes their private information (we call it the "type" of the policy holder). It is distributed on $(0,1)$ according to a continuous *c.d.f.* denoted F. The density is denoted f and is everywhere positive.
- Physicians, who may decide to be affiliated to a Health Plan or not.
- Two Health Plans in competition, indexed by i, with $i = \{A, B\}$. They provide health insurance contracts to policyholders and buy health care services from physicians.

The expected utility of a policy holder of type θ affiliated with network i is denoted $U_\theta(P_i, J_i)$. It depends on:

- the diversity index J_i, measured by the number of physicians who belong to network i. Thus there is a first indirect externality, since the decisions of physicians to join one network have an impact on the utilities of policyholders. This is meant to capture their preferences for diversity in the choice of providers.[11] The valuation of diversity is represented by a linear function $v(J_i) = \lambda J_i$.[12]
- the premium P_i paid by the policy holder to his network. For simplicity, we assume that policyholders are fully insured *i.e* there is no copayment in case of illness. We also assume that this premium is not too large (in comparison with the wealth of the policy holder) so that utility function u can be taken as linear (that is, wealth effects can be neglected).[13] The expected utility of a policy holder characterized by a probability of illness θ is:

$$U_\theta(P_i, J_i) = \theta\lambda J_i - P_i.$$

[11] This effect is very close to the Gal-Or's ex post differentiation effect. See Gal-Or (1997, 1999).

[12] This diversity valuation can be viewed as a special case of the Chernew and Frick's managedness variable.

[13] This assumption is not contradictory with a demand for insurance by policyholders (global risk aversion) if we consider illnesses with a very small probability of occurrence and a large cost of treatment. The premium will be small (so that wealth effects can be neglected) but uninsured people would face a large loss in case of illness and hence households prefer to buy insurance ex ante.

The two Health Plans compete for policyholders on one side and physicians on the other side. The profit function of Health Plan i is:

$$\Pi_i = D_i P_i - T_i \tag{1}$$

where D_i is the number of policyholders affiliated with Health Plan i and T_i the total transfer paid to physicians. We assume that Health Plans are for-profit entities and have no other objective than maximizing their profits.

3 The outcome of competition between health plans

We first analyze the determination of market shares on the policyholders side (and thus the risk segmentation). Next, we analyze the determination of market shares on the physicians' side. Finally, we determine the global market equilibrium.

3.1 Risk segmentation among policyholders

On the policyholders' side, we assume that all the market is covered[14] and we adopt a vertical differentiation framework. The market shares of the two networks on the policy holder side, namely D_A and D_B, determine the risk segmentation between the two networks. More precisely, a policy holder characterized by a probability of illness θ chooses network A rather than network B if:

$$U_\theta(P_A, J_A) \geq U_\theta(P_B, J_B)$$

In the following, without loss of generality, we assume that $J_A \geq J_B$.[15] Under the assumption that the health insurance market is completely covered, we can define the marginal policy holder's type $\tilde{\theta}$ as the type of the policy holder who is just indifferent between networks A and B.

$$\tilde{\theta} = \frac{P_A - P_B}{\lambda(J_A - J_B)} \tag{2}$$

As it is natural, policyholders with a large probability of illness ($\theta \geq \tilde{\theta}$) choose plan A, since it offers a larger diversity of physicians ($J_A \geq J_B$). Parameter λ captures the intensity of preferences for diversity. All other things equal, if λ increases, the price elasticity of policyholders' demand decreases.

[14] By this, we mean that each person is affiliated with one Health Plan.
[15] We will check that this condition is satisfied in equilibrium.

3.2 Physicians' diversity

The two Health Plans have access to identical (but distinct) pools of physicians. These physicians are heterogenous with respect to their reservation utility, *i.e.* the surplus they can obtain without being affiliated to a Health Plan. The number J_i of physicians who affiliate with Health Plan is thus an increasing function of the net utility level Φ_i offered by Health Plan i. For simplicity we assume this function is linear: $J_i = \delta\Phi_i$. δ measures the ease with which Health Plans can attract physicians. To fix ideas we assume that doctors are remunerated by a fee-for-service rate[16] R_i (if they affiliate with network i). Their utility level (including the cost of the time spent with the patient, which we call the "treatment cost") equals the product of the "profit margin" offered by the network (fee-for-service minus unit cost of treatment) by the level of activity that the physician expects to have if he joins the network. This expected activity level is equal to the expected number of consultations in the network, divided by the number of physicians in the network.

Physicians' gross utility levels, respectively when affiliated to A and B, are thus:

$$\Phi_A = \frac{(R_A - c)}{J_A} \int_{\tilde{\theta}}^{1} \theta dF(\theta)$$

and,

$$\Phi_B = \frac{(R_B - c)}{J_B} \int_{0}^{\tilde{\theta}} \theta dF(\theta)$$

where c denotes the unit cost of treatment. These formulas reveal the second indirect externality in our model, this time from policyholders to physicians: the expected level of activity of physicians depends on the number and type of policyholders who join the network.

Thus Health Plans compete in two dimensions: the level P_i of insurance premiums and the number J_i of physicians they offer access to. In other words, we assume that they adjust the level of remuneration of their affiliated doctors (through R_i or Φ_i) in such a way that it allows to attract exactly, the J_i doctors that decide to affiliate with network i. The assumption that Health Plans do not compete for the same doctors implies:

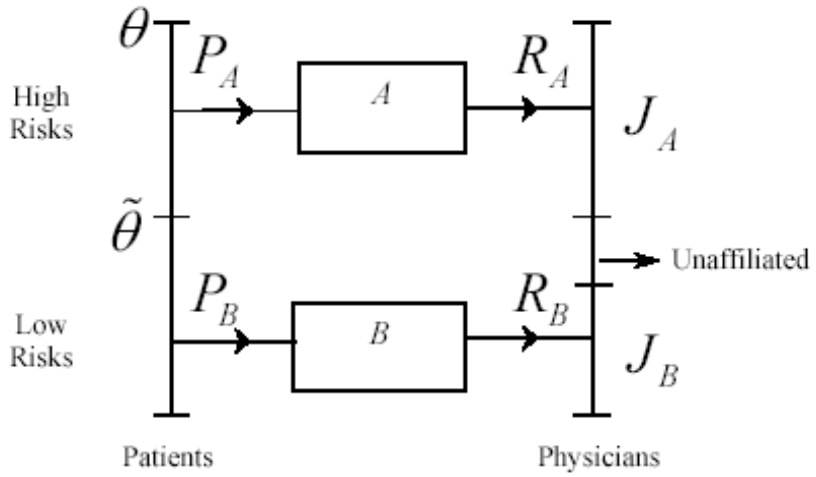
$$\Phi_A J_A = \delta J_A^2 = (R_A - c) \int_{\tilde{\theta}}^{1} \theta dF(\theta)$$

and

$$\Phi_B J_B = \delta J_B^2 = (R_B - c) \int_{0}^{\tilde{\theta}} \theta dF(\theta)$$

[16] In our model this assumption is totally neutral in the sense that it does not modify the equilibrium if we consider capitation payments.

The structure of the two markets is represented in the figure below.



3.3 Equilibrium

Given our assumptions, networks' profits are:

$$\Pi_A = (1 - F(\tilde{\theta}))P_A - R_A \int_{\tilde{\theta}}^{1} \theta dF(\theta)$$

and,

$$\Pi_B = F(\tilde{\theta})P_B - R_B \int_{0}^{\tilde{\theta}} \theta dF(\theta)$$

It is convenient to express insurers' profits in terms of premiums P_A and P_B and physicians numbers J_A and J_B. We obtain:

$$\Pi_A = (1 - F(\tilde{\theta}))P_A - \left(\delta J_A^2 + c \int_{\tilde{\theta}}^{1} \theta dF(\theta)\right)$$

And,

$$\Pi_B = F(\tilde{\theta})P_B - \left(\delta J_B^2 + c \int_{0}^{\tilde{\theta}} \theta dF(\theta)\right)$$

where we recall that $\tilde{\theta} = \frac{P_A - P_B}{\lambda(J_A - J_B)}$.

Health Plan A selects (P_A, J_A) to maximize its profit, taking (P_B, J_B) as given. The symmetric property is true for Health Plan B. The first-order conditions with respect to P_A and P_B give respectively

$$\begin{aligned} P_A &= \tilde{\theta}c + \lambda(J_A - J_B)\frac{1 - F(\tilde{\theta})}{f(\tilde{\theta})} \\ P_B &= \tilde{\theta}c + \lambda(J_A - J_B)\frac{F(\tilde{\theta})}{f(\tilde{\theta})} \end{aligned}$$

Then we have

$$\frac{P_A - P_B}{\lambda(J_A - J_B)} = \tilde{\theta} = \frac{(1 - 2F(\tilde{\theta}))}{f(\tilde{\theta})}.$$

Thus we see that the market shares on the policyholders side only depend on the properties of F, the distribution of risks. If it satisfies the monotone hazard rate property, there is a unique $\tilde{\theta}$ that satisfies the above equation. In the case of a iso-elastic distribution $F(\tilde{\theta}) = \tilde{\theta}^{\epsilon}$ we obtain for example:

$$\tilde{\theta} = (\frac{1}{2 + \epsilon})^{\frac{1}{\epsilon}}$$

This shows that the market share $1 - F(\tilde{\theta}) = \frac{1+\epsilon}{2+\epsilon}$ of network A (the one with the larger variety of physicians) increases with parameter ϵ, that measures the concentration of high risks.

The first-order conditions with respect to J_A and J_B give respectively

$$\begin{aligned} -\left[P_A - \tilde{\theta}c\right]\frac{\partial\tilde{\theta}}{\partial J_A}f(\tilde{\theta}) - 2\delta J_A &= 0 \\ \left[P_B - \tilde{\theta}c\right]f(\tilde{\theta})\frac{\partial\tilde{\theta}}{\partial J_B} - 2\delta J_B &= 0 \end{aligned}$$

Using the fact that $\frac{\partial\tilde{\theta}}{\partial J_A} = -\frac{\partial\tilde{\theta}}{\partial J_B} = -\frac{\tilde{\theta}}{J_A - J_B}$, we obtain:

$$\begin{aligned} J_A &= \frac{\lambda}{2\delta}\tilde{\theta}\left[1 - F(\tilde{\theta})\right] \\ J_B &= \frac{\lambda}{2\delta}\tilde{\theta}F(\tilde{\theta}) \end{aligned}$$

The equilibrium fee-for-service rates are respectively:

$$\begin{aligned} R_A &= c + \frac{\lambda^2}{4\delta}\frac{\tilde{\theta}^2\left[1 - F(\tilde{\theta})\right]^2}{\int_{\tilde{\theta}}^1 \theta dF(\theta)} \\ R_B &= c + \frac{\lambda^2}{4\delta}\frac{\tilde{\theta}^2 F(\tilde{\theta})^2}{\int_0^{\tilde{\theta}} \theta dF(\theta)} \end{aligned}$$

And premiums are given by:

$$\begin{aligned} P_A &= \tilde{\theta}c + \frac{\lambda^2}{2\delta}\tilde{\theta}^2[1 - F(\tilde{\theta})] \\ P_B &= \tilde{\theta}c + \frac{\lambda^2}{2\delta}\tilde{\theta}^2 F(\tilde{\theta}) \end{aligned}$$

We can see that the mark-ups (defined as premiums minus marginal costs $\tilde{\theta}c$)[17] are proportional to the market shares. This comes from the differentiated oligopoly structure. If we consider the case of an iso-elastic distribution, we have for example:

$$\begin{aligned} D_A &= 1 - F(\tilde{\theta}) = \frac{1+\epsilon}{2+\epsilon} \\ D_B &= F(\tilde{\theta}) = \frac{1}{2+\epsilon}. \end{aligned}$$

This gives:

$$\frac{D_A}{D_B} = 1 + \epsilon$$

Similarly, the ratio of physicians numbers is:

$$\frac{J_A}{J_B} = 1 + \epsilon$$

The ratio of fee-for-service rates is:

$$\frac{R_A - c}{R_B - c} = \frac{(1+\epsilon)^2}{(2+\epsilon)^{\frac{1+\epsilon}{\epsilon}} - 1}$$

It is worth noticing that in the uniform distribution case ($\epsilon = 1$), we have

$$\begin{aligned} D_A &= 2D_B \\ J_A &= 2J_B \\ R_A - c &= \frac{1}{2}(R_B - c) \end{aligned}$$

The uniform distribution case allows to illustrate easily the main point of the two-sided market mechanism: thanks to a higher number of physicians affiliated, network A, that attracts high risk policy holders, can bargain a lower fee-for-service rate with physicians.

[17] Note that both networks have the same marginal cost $\tilde{\theta}c$. Indeed, consider for example network A. Its market share is $D_A = 1 - \tilde{\theta}$ and its total cost is $C_A = c\int_{\tilde{\theta}}^{1} \theta dF(\theta)$. Thus its marginal cost is $C'_A = \frac{\tilde{\theta}cf(\tilde{\theta})}{f(\tilde{\theta})} = \tilde{\theta}c$.

Proposition 1 *The market equilibrium is characterized by the following properties:*

- *The market shares (and risk segmentation) on the policyholder side only depend on the distribution of risks:*[18]

$$\tilde{\theta} = \frac{(1 - 2F(\tilde{\theta}))}{f(\tilde{\theta})}$$

- *The numbers of physicians affiliated with each network are proportional to the ratio* $\frac{\lambda}{\delta}$*:*

$$\begin{aligned} J_A &= \frac{\lambda}{2\delta}\tilde{\theta}\left[1 - F(\tilde{\theta})\right] \\ J_B &= \frac{\lambda}{2\delta}\tilde{\theta}F(\tilde{\theta}) \end{aligned}$$

- *The mark-ups on insurance premiums increase with* λ *and decrease with* δ*:*

$$\begin{aligned} P_A - \tilde{\theta}c &= \frac{\lambda^2}{2\delta}\tilde{\theta}^2[1 - F(\tilde{\theta})] \\ P_B - \tilde{\theta}c &= \frac{\lambda^2}{2\delta}\tilde{\theta}^2 F(\tilde{\theta}) \end{aligned}$$

By replacing premiums and physicians numbers by their equilibrium values in the insurers' profits, we obtain the values of the profits of networks in equilibrium:

$$\begin{aligned} \Pi_A &= \frac{\lambda^2}{4\delta}\tilde{\theta}^2[1 - F(\tilde{\theta})]^2 + c\left[\int_{\tilde{\theta}}^{1}(\tilde{\theta} - \theta)dF(\theta)\right] \\ \Pi_B &= \frac{\lambda^2}{4\delta}\tilde{\theta}^2 F(\tilde{\theta})^2 + c\left[\int_{0}^{\tilde{\theta}}(\tilde{\theta} - \theta)dF(\theta)\right] \end{aligned}$$

Proposition 2 *The profit of A is higher than B's profit if* $\frac{\lambda^2}{4\delta c} > K(\tilde{\theta})$*, with* $K(\tilde{\theta}) = \frac{\int_0^1 |\tilde{\theta} - \theta| dF(\tilde{\theta})}{(1 - 2F(\tilde{\theta}))\tilde{\theta}^2}$

In equilibrium, insurer A makes a higher profit than B if policyholders' preference for diversity is strong enough. By contrast, when the coefficient δ, that measures the ease with which Health Plans can attract physicians becomes high enough, insurer A's advantage in terms of bargaining power is reduced and the fee-for-services rates applied by both insurers converge to the same value.

[18] Note that network A has always more than half of the market: $F(\tilde{\theta}) > 1/2$.

Then, insurer B's profit can become higher than A's because the latter suffers from an unfavorable risk segmentation on the policyholders' market.

Proposition 2 shows that the insurer with the highest number of physicians affiliated and the highest level of risks among policyholders demand (*i.e.* insurer A) may nevertheless realize the highest level of profits. This result is interesting if we have in mind the debate about the so-called "spiral of death" that can emerge between Conventional Insurers and HMOs (see Baker and Corts, 1996) and if we view the former as the insurers with the highest diversity. It is explained that HMOs, thanks to vertical restraints, can obtain important discounts when reimbursing health care on the supply-side[19] and moreover benefit from an advantageous risk segmentation on the demand-side. Then conventional insurers may be forced to increase their premiums and may suffer from an "adverse selection spiral". This approach, that suits well with the nature of competition between conventional insurers and MCOs, is typically one-sided in the sense that conventional insurers do not benefit from discounts. Actually, in this case, there is only one externality through the risk segmentation effect *i.e* the premium paid by one policy holder depending on the average risk of the policyholders of his insurer. When we have PPOs, the nature of competition is transformed by an indirect externality. A PPO that has a relative high number of physicians affiliated attracts more policyholders, and moreover policyholders with a higher risk, risk segmentation still mattering. The horizontal externality previously mentioned is still there, in relation with risk segmentation. But in this case, it can become an advantage through the bargaining process with hospitals and physicians *i.e* the indirect externality effect. Indeed, the PPO can benefit from higher discounts, specifically when it pays physicians with fee-for-service. Our results show that in some cases, this effect can be more important than the direct impact of risk segmentation *i.e* a higher frequency of reimbursement. In equilibrium, the insurer with the highest diversity of physicians (and thus with policyholders characterized by a higher risk on average) may make more profit.

4 Conclusion

In this paper, we analyze the outcome of competition between Health Plans by focusing on the consequences of risk segmentation on the ability of these plans to negotiate discounts with physicians. As Chernew and Frick (1999) suggest, a two-sided framework can help understanding the rise in "intermediate managed care plans" such as PPO and POS (Morrisey and Jensen, 1997). Indeed, our model shows that the apparent disadvantage of having high risk policyholders due to a higher flexibility can in reality favor Health Plans.

As it is mentioned in Howell (2006), the two-sided nature of the health care markets may have some strong implications for competition policy. Even if this

[19] See Melnick et al. (1992) and Brooks et al. (1997).

paper only provides a preliminary analysis, our model allows to highlight the role of indirect externalities between both sides of the market. More precisely, in an one-sided logic, we could have thought that i°) the unfavorable risk segmentation of the more flexible heath plans and ii°) the discounts obtained by MCOs are two arguments for MCOs to restrict more the choice of physicians. In such context, vertical agreements could have been perceived as a tool to distort competition: the more restrictive is the Health Plan, the lower is the risk of his policy holders and the higher its profits are. On the contrary, our two-sided framework allows to explain the phenomenon of higher flexibility that we have observed for the last decade in the United States. Thanks to the higher risk of their policy holders, Health Plans that offer more flexibility negociate higher discounts when physicians are paid on fee-for-service rates. In our two-sided framework, this last point can outweight the unfavorable risk segmentation effect. In terms of competition policy, it suggests that the degree of vertical integration in the health insurance sector does not introduce distortion for competition.

This paper is a first attempt to study the health insurance market from a two-sided perspective *i.e* by taking account both direct and indirect externalities. Nevertheless, our analysis could be extended in several directions:

- The application of a copayment whenever a patient visits a physician outside from the network can be an interesting policy instrument for Health Plans. As we described in the introduction, the level of coverage is a screening instrument for insurers. Coverage differentials also contribute to the emergence of possible spirals of death. MCOs usually use copayments as an incentive to limit expenses. Analyzing such copayments would require to model the patients' *ex post* choices between physicians belonging to their network and the others.

- It might be relevant to introduce other types of heterogeneity among physicians such as their degree of altruism (see Jack [2004] and Choné and Ma [2006]) or their disutility of work. In this case, the features of our equilibrium could be changed. Physicians with a high disutility of work would probably prefer to choose the Health Plan with the lowest demand for health care.

- We have used a duopoly model. It would also be interesting to extend it to an oligopoly framework in order to analyze concentrations and mergers aspects.[20] An oligopoly framework would also allow to analyze the relative bargaining powers of Health Plans and Physicians groups according to the respective concentration of their markets.[21]

- We have assumed exclusivity: physicians can only be affiliated with an unique MCO. In practice, some physicians work for several networks and

[20] As it is done in Gal-Or (1999).

[21] In other words, to resume the analysis of Brook et al. (1997) with our two-sided issue.

are not constrained by exclusivity contracts. It would be relevant to consider multi-homing aspects[22] in our two-sided framework.

- Finally, this paper could motivate some empirical works. Indeed, it would be interesting to estimate the link between the risk level of policyholders affiliated to networks, the networks' diversity index and the fee-for-service rate levels that they paid to physicians.

In conclusion, although this paper focuses on some specific dimensions, the analysis provided here already suggests some consequences of the two-sided nature of the health insurance market. As advocated eloquently by Wright (2004), policy makers have to be careful in order to avoid the fallacies of one-sided logic applied to a two-sided context.

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